Department of
Environmental Protection
Bureau of Land & Water Quality June 2004
O&M Newsletter

A monthly newsletter for wastewater discharge licensees, treatment facility operators, and associated persons

Dechlorinating your BOD_5 Samples

Last year the Department sent notification to dischargers requesting that effluent samples be collected after the chlorine contact chamber. This change resulted in the need for many operators to begin dechlorinating their BOD samples in the laboratory. The following procedure is acceptable to the Department.

- ✍ Determine the TRC of your composite effluent sample using an EPA approved method. If the TRC is ? 0.05 mg/L then this sample is considered dechlorinated and you may proceed with setting up your seeded BOD samples. Please record your pre-analysis TRC result on your benchsheet. If you want you can follow the first 4 steps noted below to determine if you need to dechlorinate your effluent sample.
- ✍ If the TRC of your effluent sample is >0.05 mg/L then you may leave the sample on your bench in front of a window for 1-2 hours. Remember, the sample can not be left unrefrigerated for more than 2 hours prior to analysis, so keep that in mind if you leave the sample out on the bench. Every effluent is different but typically this technique works best for effluent samples with a TRC of 0.1mg/L or less.
- ✍ If you need to dechlorinate your sample in the laboratory then the following steps need to be taken.

1. Add 100 ml of a well-mixed portion of the composited effluent to a 250-ml Erlenmeyer flask.
2. Add 10 mls of either 1:1 acetic acid solution or 1:50 sulfuric acid solution to the flask and swirl to mix or place on a magnetic stirrer.
3. Add 10 mls of 10 % potassium iodide solution and 1 ml of starch indicator solution. Mix.
4. If a blue-black color appears then chlorine is present and you must add **sodium sulfite** to dechlorinate your sample. If no color appears then proceed with the seeded BOD analysis. Make a note on your benchsheet if you did not find any chlorine residual in your sample.
5. Prepare sodium sulfite solution daily by weighing out 0.1575 grams of sodium sulfite and adding it to 100 mls of distilled water. Be careful here because it is very difficult to measure such a small amount of sodium sulfite accurately. Standard Methods recommends adding 1.575 grams of sodium sulfite to 1000 mls of distilled water. However, the Department recognizes this is typically far more of the solution then any facility will need and we are trying to avoid a lot of waste on your part. Alternatively, you can dilute a 5% solution by measuring out 3 to 3.2 mls of 5% sodium sulfite and diluting to 100 mls with distilled water.
6. Using a pipette and pipette pump, burette or dropper add the diluted sodium sulfite solution to the flask. Mix well throughout this process. Stop adding this solution as soon as the sample becomes clear. Record the number of mls or drops of sodium sulfite solution added to the

flask on your benchsheet. Note: You are only looking for the amount needed for the first disappearance of the color. The color will reappear if the sample sits for a while.

7. Determine the amount of sodium sulfite solution you need to add to the effluent sample you will be using for your BOD_5 analysis. For example, if it takes 3 mls (or drops) of sodium sulfite to dechlorinate the sample in the flask then you will need to add 15 mls (or drops) of sodium sulfite solution to a 500 ml sample used for the BOD_5 analysis. Record the number of mls or drops of sodium sulfite solution added to your effluent sample on the bench sheet.
8. Add the appropriate amount of sodium sulfite to your effluent sample and stir for 10 to 15 minutes.
9. Check the sample for Chlorine residual using an EPA approved method or steps 1 through 4 above. Record this TRC result on the benchsheet. If chlorine is present then repeat the dechlorinating procedure.

Remember: If you have questions feel free to call your inspector for help. MRWA is another great resource and Janet Abrahamson can be reached at 729-6569.

Don Albert

BOD Holding Time and Temperature

The following is a discussion of BOD holding time and temperature as excerpted from Standard Methods, 18th Edition.

Biochemical oxygen demand (BOD) is usually defined as the amount of oxygen required by bacteria while stabilizing decomposable organic matter under aerobic conditions. The term "decomposable" may be interpreted as meaning that the organic matter can serve as food for the bacteria, and energy is derived from its oxidation. Decomposition begins immediately after the sample is collected and is a function of the storage temperature.

In general, the shorter the time that elapses between collection of a sample and its analysis, the more reliable will be the analytical results. It is impossible to state exactly how much elapsed time may be allowed between sample collection and analysis; this depends on the character of the sample and the conditions of storage.

To minimize the potential for biodegradation between sampling and analysis, keep samples as cool as possible without freezing. Preferably, pack samples in crushed or cubed ice or commercial ice substitutes before shipment. Analyze samples as quickly as possible on arrival at the laboratory. If immediate analysis is not possible, storage at 4^oC is recommended.

For grab samples, if analysis is begun within 2 hours of collection, cold storage is unnecessary. If analysis is not started within 2 hours of sample collection, keep sample at or below 4^oC from the time of collection. Begin analysis within 6 hours of collection; when this is not possible because the sampling site is distant from the laboratory, store at or below 4^oC and report length and temperature of storage with the results. In no case start analysis more than 24 hours after grab sample collection. When samples are to be used for regulatory purposes, make every effort to deliver samples for analysis within six hours of collection.

For composite samples, keep samples at or below 4^oC during compositing. Limit composite period to 24 hours. Use the same criteria as for storage of grab samples, starting the measurement of holding time from end of compositing period. State storage time and conditions as part of the results.

The foregoing discussion is by no means exhaustive and comprehensive. Clearly, it is impossible to prescribe absolute rules for preventing all possible changes. To a large

degree, the dependability of an analytical determination rests on the experience and good judgment of the person collecting and analyzing the sample.

Standard Conditions

This is another in the series of articles that will cover all of the "STANDARD CONDITIONS" found in all permits. The standard conditions that apply to you are those that were included with your waste discharge license. The version of "STANDARD CONDITIONS" that is the subject of this series is a revision issued on July 1, 2002. It is essential that you read and understand the standard conditions. This most recent revision of "STANDARD CONDITIONS" can be found on line at: **http://www.state.me.us/dep/blwq/docstand/wastepage.htm#gen**

B. OPERATION AND MAINTENANCE OF FACILITIES

1. General facility requirements.

(a) The permittee shall collect all waste flows designated by the Department as requiring treatment and discharge them into an approved waste treatment facility in such a manner as to maximize removal of pollutants unless authorization to the contrary is obtained from the Department.

(b) The permittee shall at all times maintain in good working order and operate at maximum efficiency all waste water collection, treatment and/or control facilities.

(c) All necessary waste treatment facilities will be installed and operational prior to the discharge of any wastewaters.

(d) Final plans and specifications must be submitted to the Department for review prior to the construction or modification of any treatment facilities.

(e) The permittee shall install flow-measuring facilities of a design approved by the Department.

(f) The permittee must provide an outfall of a design approved by the Department which is placed in the receiving waters in such a manner that the maximum mixing and dispersion of the wastewaters will be achieved as rapidly as possible.

Most of the items in paragraph 1 are self-explanatory, so this article will focus only on a few points. Under (a), the Department needs to be informed of all pollutants and waste streams. All discharges must be through permitted outfalls, under appropriate treatment and permit requirements. Any changes in pollutants, discharge circumstances or treatment facilities, as well as unauthorized discharges, must be promptly reported to the Department. Also, the sentence about maximizing removal of pollutants seems to imply a standard beyond compliance within permit limits. The maximum that the Department can require is compliance with permit limits, but we strongly encourage treatment beyond compliance for several reasons. Going beyond compliance provides a buffer against monthly or weekly average violations when there are days with treatment difficulties, and discharging lighter loads of pollutants will benefit the waters and all who use or are affected by them. Under (d), (e) and (f), the main thrust is that the Department needs to review and approve all new facilities and substantial modifications, including flow measurement equipment and methods as well as outfall designs, before the upgrades or new construction begin.

Within (b) there are two terms that bear more discussion. These are "good working order" and "operate at maximum efficiency". Generally, good working order is having all equipment and facilities ready for dependable operation whenever they are needed for compliance. This includes back up systems such as alarms and emergency power sources. Critical elements to achieve this are such things as a good, preventive maintenance program, routine testing of backup systems, and quick remediation of breakdowns and failures. The facility should have an appropriate supply of parts and materials for both

routine and emergency repairs and maintenance. All treatment units and equipment should be operated within design standards in order to prevent undue wear and sub-optimal performance. Major maintenance or replacement should be scheduled when having the equipment off-line will be unlikely to cause non-compliance. The Department will consider a facility's overall maintenance program when determining an appropriate compliance/enforcement response to non-compliance that results from a failure of collection, treatment and/or control facilities.

As with maximizing removal of pollutants, the minimum standard for operation at maximum efficiency is to achieve permit limitations, and it is in your interest to go beyond permit compliance as insurance against upsets and unforeseen difficulties in providing treatment. To ensure operation at maximum efficiency, facilities should have sound, up-to-date operations & maintenance plans, and high flow management plans, etc. Process control planning should include performance assessment and anticipation of expected changes (such as daily cycles and seasonal variations in influent characteristics).

2. **Proper operation and maintenance.** *The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.*

This paragraph extensively overlaps with Paragraph 1 concerning proper operation and maintenance, but it does expand the discussion to such items as measurement and sampling equipment. Every facility should calibrate flow meters and other measuring equipment at least as frequently as specified by the manufacturer, and maintain the calibration records. All sampling and testing procedures should be described in a QA plan.

In some critical areas, the facility must have back-up or auxiliary equipment to provide additional treatment capacity or the ability to provide treatment in the event that a primary piece of equipment fails. These back-ups must also be maintained in a ready state, such that when they are needed, they will allow the facility to remain in compliance with permit limits. This requirement is more fully detailed in Standard Condition E.1. (July 16, 2001 & July 1, 2002 versions) and will be a subject for a future article.

As always, if you have any questions or concerns regarding your license or any other water compliance issues, contact your facility Inspector. He or she will be able to work with you, or direct you to the appropriate Departmental resources.

All water quality laws and regulations can be accessed at: http://www.maine.gov/dep/environlrr.htm

Phil Garwood
Enforcement Section
Division of Water Resource Regulation

Approved Training

June 10, 2004 in Bangor, ME – Under-standing Comp Time - Sponsored by MRWA–729-6569 – Approved for 2.5 hours
*****
June 24, 2004 in Dover-Foxcroft, ME – Lagoon Day - Sponsored by MRWA – 729-6569 – Approved for 5 hours
*****
August 11, 2004 in Portland ME – Activated Sludge – Sponsored by Penn State Univ. – 814-863-6106 – Approved for 6 hours
August 12, 2004 in Portland ME – biological Nutrient Removal – Sponsored by Penn State Univ. – 814-863-6106 – Approved for 6 hours